Case study to illustrate the application of Step 4 of the UKCIP Adaptation Wizard

About Severn Trent Water

As a major water utility operating in the Midlands and Mid Wales, Severn Trent Water (STW) is required to report under the climate change act on its assessment of the critical risks climate change poses to the company, and on the actions being taken to address those risks. A thorough quantitative risk assessment was completed by STW, following which work was required to identify suitable adaptation options to address those risks. UKCIP helped STW to facilitate a workshop to initiate this task and to help refine a methodology whereby this could be done. Specific aims of the workshop were to:

- Share the work on the climate risk assessment with STW colleagues and build a wider understanding of the need to build adaptive capacity and resilience in STW
- Review findings of climate change risk assessment
- Initiate discussion and develop options to manage risks
- Identify potential options for further evaluation within existing internal processes
- Agree on a series of next steps to document options, pathways and processes

STW's risk assessment was conducted using its own internal methodologies. However, output from this process was a set of priority climate risks as would have been achieved by working to the end of Step 3 of the UKCIP Adaptation Wizard. Outputs from STW's risk assessment were thus fed into Step 4 of the Wizard process, "Identify, assess and implement adaptation options". The experience and lessons learnt from this options identification and evaluation exercise are presented here as a resource for others conducting similar exercises.

Step 3: Assess your vulnerability to future climate change

Task 3.6: What are the priority risks that require an adaptation response?

Priority risks had been identified thorough quantitative risk assessment conducted in the months prior to the workshop. Four key risks were chosen for consideration at the workshop:

Waste Water & Nuisance Risk 1: Higher temperatures bring about increased levels of septicity and increasing odour at our sewage treatment works and pumping stations. This may lead to an increase in the number of odour and nuisance complaints.

Waste Water & Renewable Energy Risk 2: Higher rainfall results in waste water being flushed out of the sewage system, causing pollution of receiving water bodies and reduction in sludge availability for renewable energy production

Water Resources Risk 3: Decreased summer precipitation increases pressure on ecosystems and may lead to a reduction in abstraction licences and therefore decreased water supply.

Water Resources Risk 4: Lower summer rainfall leading to decreased water levels and decreased water quality

Step 4: Identify, assess and implement adaptation options

Task 4.1 Identify a range of adaptation options for each priority risk

Two breakout groups were formed with one addressing the water quality risks and the other addressing the water resource risks. The breakout groups were populated by colleagues from across the organisation that had the most relevant expertise in relation to each topic. Each group identified a 'long list' of adaptations that could be taken to address the priority risks. All contributions were captured; none was excluded. Examples of some of the options that were proposed are illustrated in the tables below.

Risk	Examples of proposed options
Waste Water/Nuisance risk 1 Higher temperatures bring about increased levels of septicity increasing odour at our sewage treatment works and pumping stations. This may lead to an increase in the number of odour and nuisance complaints	1. Limit development around STWs treatment plants – liaison with planners needed 2. Move STW's to remote areas 3. Chemical dosing/covered tanks – traditional odour control methods such as filtration 4. Tree planting as a natural barrier 5. Diverting odour/dilution/scrubbing 6. Different treatment methods to reduce odour and insect larvae 7. Do nothing – requires customer engagement and agreement 8. Investment in odour modelling and forecasting 9. Identify trigger levels and circumstances in which to turn odour control on 10. Temperature measurement (and forecast) linked to odour control and engaging with customers

Risk	Examples of proposed options
Waste Water risk 2 Higher rainfall results in waste water being flushed out of the sewage system causing pollution of receiving water bodies and reduction in sludge availability for renewable energy production.	1. Relationship between treatment cost reduction and loss of revenue from reduced biogas and CHP production 2. Increased storage capacity within the sewerage network at and STWs so less is lost to rivers 3. Surface water separation (SUDS) 4. Mixed portfolio of renewable generation 5. Sewer cleansing programme scheduled at correct times of year 6. Agreed timed discharges for commercial customers (sewerage triad) 7. Storage capability for tankered waste 8. Use sewer cleansing wastes in digesters rather than disposal via landfill

Risk	Options
Water Resources Risk Decreased summer precipitation leads to increased pressure on ecosystems and may lead	1. Reduce demand 2. Reduce leakage though increased investment in infrastructure 3. Invest and plan for grey water 4. Influence planning standards for new build 5. Introduce rotas for hosepipe use

to a reduction in abstraction licences and therefore decreased water supply	6. Service level agreements may need to be negotiated 7. Provide alternative sources of supply 8. Increase number of operational staff 9. Better understand contractors available and how to work together 10. Develop multi-skilled staff 11. De-silt storage facilities - store water not silt! 12. Raise dam walls 13. Collaborate with other water companies to trade water 14. Effluent re-use (waste to tap) etc.

Risk	**Options**
Water Resources Risk 4: Lower summer rainfall leading to decreased water levels and leading to decreased water quality	1. Supply 2 qualities of water: potable and non-potable (cf. Spain) 2. Upgrade water treatment equipment* 3. Upgrade sewage treatment 4. Change standard, relax drinking water standards 5. Effective catchment management 6. Use of natural barriers* 7. Ground water compensation schemes 8. Dilution at point of abstraction 9. Increased proportion of groundwater use 10. Using artificial recharge 11. Reusing abandoned sources 12. Simple solutions what can be deployed seasonally (temporary mobile plant) 13. In-river treatment (e.g. oxygenation of rivers) Etc.

Task 4.2 Establish the criteria against which you will evaluate your 'long list' of adaptation options

The UKCIP Adaptation Wizard calls for organisations to establish the criteria against which they can **evaluate the ability of each option to achieve their strategic objectives**.

A common list of criteria has emerged from the literature and from UKCIP's practical experience as described in Step 4.2 of the UKCIP Adaptation Wizard. This list of common criteria was presented to workshop participants as a starting point. They then collectively agreed on a subset of criteria against which to assess each potential adaptation option, recognizing that these may need to be reviewed in relation to other risks / contexts. The following criteria were selected:

- Flexibility
- Sustainability
- Equity
- Cost
- Acceptability
- Robustness
- Timing (ie. how long would it take from identifying an option to implementing it)
- Coherence with overall business plan
- Effectiveness

Each working group then discussed what each of these criteria meant to them in order to develop a common understanding of each. Definitions were written on a flip chart to which all could refer during the exercise. This proved critical to ensuring analysis was based on a common understanding.

Each group then discussed and agreed on how a high or low score under each criteria could be defined, with a “high” score of (3) being favourable and “low” score of (1) being unfavourable. So for example an option that aligned strongly with other business objectives would gain a “high” score of 3 against this criteria; a very expensive option would achieve a score of 1 against cost . Agreed definitions of each criterion are shown below.

Criterion	High (3)	Low (1)
Flexibility	A flexible measure is one that: you can shift around, turn on/off; brings wide ranging benefits to lots of people; offers choice that can be exerted easily; is adaptable and can be implemented flexibility; is scalable,	Is the opposite of high (locks you in)
Sustainability	This refers to mitigation, as well as social and environmental benefits and costs. The measure has long asset life.	There is a limited time over which benefits will be enjoyed. Detrimental to community and environment.
Equity	No customers are disadvantaged	Some customers are disadvantaged
Cost	Has low whole life costs, including capital, operating and maintenance costs.	Has high whole life costs, including capital, operating and maintenance costs
Acceptability	Is stakeholder focussed and provides solutions that are acceptable to wide range of stakeholders	Is not acceptable to a wide range of stakeholders and is likely to conflict with some stakeholders
Effectiveness	Very likely to reduce risks	Potential to reduce risk is low or unknown
Timing/ urgency	The issue of timing relates to flexibility considerations (eg. how long will it take to get something up and running?). A high score will be give if there is a short time from initiation to completion and the option can secure a quick win, or if the adaptation is part of planned approach that is aligned with the investment period.	Long term to complete (won’t be operational quickly) Reactive approach with investment in response to current issues,
Robustness	Is able to operate efficiently across a wide range of variables/uncertainties. Not contingent on third parties. Minimal impacts. Not very risky	Can only cope well with a specific or limited set of variables or uncertainties; is highly sensitive to future changes; could be susceptible to change in political climate/ regulation. Contingent on third parties. Risky.

Coherence/ alignment	Consistent / aligned with other strategic objectives. Synergistic (eg. ticks > 1 business objective)	Has negative impact or conflicts with other strategic objectives

Discussion of the process

A number of learning points can be taken from this exercise:

1. Workshop feedback revealed they had found the process useful, particularly in reaching a common understanding of the issues raised.

2. It is crucial to come to a collective understanding of what each criterion means and how it might be measured. Writing up definitions of each criterion along with a descriptor of what a high and low score would mean on a flip chart for all to refer to during the exercise helps ensure a common approach.

3. The initial intention had been to rank options according to high, low and medium scores for each criterion. In practise it proved too difficult to provide meaningful definitions for three levels of ranking, and it was agreed that only high and low scores should be used, with a medium score of “between high and low” being assigned in only a few instances where high and low scores seemed inappropriate.

4. Some criteria were clearly more important to the organisation than others – as is likely to be true of any organisation – calling for those criteria to be weighted more heavily than others in line with the organisations priorities and strategic objectives.

5. It was very important to capture the thinking that lies behind the scoring process so that decisions could be clearly communicated to others. This thinking can be quickly lost after leaving the workshop so it’s important to capture it accurately at the time for application later.

6. Options identification and appraisal can be time consuming, especially when common agreement on definitions and ranking is required, As many as 36 options were identified for a single risk, each of which would need to be evaluated according to the nine criteria agreed on at the outset The process was valuable though and did speed up as participants become more familiar with the rankings being applied,

7. Different options may require quite specialised, technical expertise to evaluate making it important that the right people are included in the options identification and evaluation steps.